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East Europe Report

SCIENTIFIC AFFAIRS

No. 777

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CONTENTS

DEVELOPMENT OF ELECTRONICS, COMPUTER INDUSTRY IN SOFIA

Sofia VECHERNI NOVINI in Bulgarian 2 Apr 83 pp 1, 2

[Article by Lyuben Popov, head of the Industrial Department of the Sofia BCP City Committee, and Atanas Buchvarov, instructor in the Industrial Department of the Sofia BCP City Committee: "The Intellect of the Capital's Economy"]

[Text] Electronic Products Creating New Trends in Industry

Automation through Problem-Oriented Systems

"Successors" of the Sofia-81 Color Television Set

The 12th BCP Congress defined as a basic task of the Eighth Five-Year Plan the wide-scale intellectualization of labor and the performance of every activity in society. This means the stepped-up introduction of automation systems and of electronic computer and microprocessor equipment into all spheres of life.

The role of the capital's electronics industry is exceptionally great not only for the sector but also for the development of our national economy. There are now operating in Sofia eight development, eight production, five engineering and service enterprises in electronics. They include such strategic areas as microelectronics, computer equipment, automation instruments and systems, communication equipment etc.

Capital city enterprises producing electronic output have a 9-percent share of the commodity production of Sofia's industry, 13.3 percent of the profit and 13.5 percent of the net production. The social productivity of labor that has been achieved is higher than the average for the capital and for the country. The 1982 plan for total industrial output was fulfilled 102.7 percent and for profit 105 percent. An average annual growth rate of 25 percent for profit and 22 percent for the social productivity of labor was attained. New structure-defining products have been introduced such as the IZOT-1016S minicomputers, digital program controls for machine tools, dial telephone exchanges with microprocessor control, Sofia-81 and Sofia-82 color television sets and many others.

Decree No. 49 of the Council of Ministers provides that the "Elektronika" [Electronics] Computer Equipment Plant, the Telephone and Telegraph Equipment

Plant, the Kl. Voroshilov NPK [Scientific Production Combine], the Electronic Transducer Elements Plant, the Central Computer Equipment Institute, and the institutes for the communication industry, radioelectronics and microelectronics shall become standards of intensive development during the Eighth and Ninth Five-Year Plans on the basis of comprehensive automation and the introduction of the most up-to-date technologies.

In what directions will the capital's electronics industry develop? In computer equipment, in addition to central and matrix processors, a rapid increase in the production of integrated systems is envisaged. The production of POK's [problemno-orientirani kompleksi; problem-oriented systems] and applied computer systems based on large and small electronic computers will be expanded, too. This will be concentrated in the "Elektronika" ZIT [Computer Equipment Plant] and the "Izotkomplekt" Engineering Enterprise. The problem-oriented systems developed at TsIIT [Central Computer Equipment Institute] will create conditions for the automation of information and administrative activity, of large warehouse facilities, engineering work etc. Most of the systems produced will be introduced in Sofia. In this area lies the important task of constructing an automated control system for Sofia.

The "Propusk" [Pass] problem-oriented system will automatically record arrivals and departures from work. This will create conditions for the introduction of so-called "floating" work time in enterprises, institutes and institutions. The "Inforeg" POK, based on a small electronic computer, can automate a considerable part of information and inquiry activity in administrative services and will help improve their quality. The "Turgoviya" [Trade] POK will automatically report commodity turnover and keep track of the stock in hand so that commodity shortages will promptly be eliminated. The "Baza" [Storage Facility] POK will automate the control of large storage facilities. In 1982 a SAIT [sistemata za avtomatizatsiya na inzhenerniya trud; system for the automation of engineering work] was introduced at ZIT. It automates a number of routine operations in design activity and improves the quality of the design solutions.

The development of software will be inextricably linked with the production of automation systems. To achieve significantly better results, the efforts of a significant number of highly skilled programmers working in units of the Ministry of Machine Building and Electronics, the Integratted Social-Information Committee, the Bulgarian Academy of Sciences etc. must be coordinated. The students of higher educational institutions are a large potential reserve. To create the necessary organization and make fuller use of the capabilities of the capital's scientific and technical potential, the Commission for Scientific and Technical Progress in the Bureau of the BCP City Committee will consider a coordination program.

Substantial changes in the development of the communication industry will occur as a result of the introduction of microprocessor equipment. In close cooperation with Soviet specialists, dial telephone exchanges with microprocessor control and digital-transfer equipment will be developed and introduced. Our country will participate in the uniform switching equipment system and the uniform digital information-transfer system of CEMA-member countries, and there are

certain items which it will specialize in producing. This will create the preconditions during the Ninth Five-Year Plan for beginning the production, jointly with the USSR, of integrated digital systems. In these will be combined the most advanced ideas for constructing a communication network with computer software methods and the high technical and economic capabilities of microelectronics. The communication equipment will be entirely produced and engineered at ZTTT [expansion unknown; possibly telephone and telegraph equipment plant], the Kl. Voroshilov SZ [expansion unknown] and "Respromkomplekt" IP [expansion unknown]. In addition to these tasks, the Kl. Voroshilov SZ will continue to produce color television sets at an increasing rate in order to meet the needs of the capital and the country. The Sofia-81, and the Sofia-82 and Sofia-83 modifications of it are notable for their high quality.

The development of a components depot will continue as a computer and communication-equipment supply system in the capital. Work is under way in this area at IME [expansion unknown], ZEPE [expansion unknown] and ZEST [expansion unknown]. The purpose is, on the one hand, to expand the production capabilities and, on the other, to integrate the efforts of the specialists who are working in this field from units of the Ministry of Machine Building and Electronics, the Bulgarian Academy of Sciences, the Lenin VMEI [Higher Machine Electrical Institute] etc.

The production of medical equipment in Sofia is concentrated in the Medical Equipment Combine. Impending are the complete updating of products and the production of package special-purpose rooms and systems with the increasingly mass-scale introduction of microprocessor equipment for information processing, visualization and recording. The further improvement of health services in Sofia requires improvement of the material and technical base as well.

One of the most important goals for the capital's electronics industry is a sharp rise in the quality and competitiveness of the products produced. This necessitates systematic and constant work. Quality must become a prime concern of supervisors, specialists and performing personnel. This problem must be solved comprehensively by the further introduction of integrated quality-control systems.

The accelerated development of the capital's industry is inextricably linked with the development of electronics. This also ordains this sector's great responsibility to party and economic agencies and organizations, as well as to labor collectives, for a worthy contribution to the building of Sofia as a model socialist city.

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GDR PHOTO EQUIPMENT USED IN SOVIET SPACE VENTURES

East Berlin VOLKSARMEE in German No 11, 1983 (signed to press 7 Mar 83) p 8

['Science and Technology' report by Horst Hoffmann: "From Three Stages Remote Sensing of the Earth: Complete GDR Equipment Packets Presented at Second Outer Space Conference of United Nations"]

[Text] For almost 7 years now, six-channel multispectrum cameras of the type MKF 6 from the Carl Zeiss State Combine of Jena have given a good account of themselves in three space flights and many aircraft missions. In September 1976 this precision camera, which was developed jointly by scientists of the USSR and the GDR, was tried out for the first time in space during an 8-day flight by the two Soviet cosmonauts, Colonel Dr Valeri Bykovskiy and Dr Vladimir Axyonov, on board the Soyuz 22, a spacecraft specially designed for this purpose. A modified design, MKF 6 M, was installed in the orbital station Salut 6, which circled the earth from 1977 to 1982. Since April of last year, an additionally improved camera of this type has been on board Salut 7.

All told, 20 different cosmonaut crews from 10 countries have taken tens of thousands of photographs with this Zeiss equipment. One of these crew members was also our research cosmonaut, Colonel Sigmund Jaehn, whose space flight marks its fifth anniversary this year. At the second outer-space conference of the United Nations, UNISPACE 82 in Vienna, he was one of those much sought after by people wishing to talk with him. Also constantly beleaguered was the GDR collective booth at the largest international cosmonautics exhibition so far, which took place at the same time at the Vienna Fair Palace.

There, the state combines of Carl Zeiss of Jena and Robotron demonstrated for the first time in a foreign country a complete equipment packet for the remote sensing of the earth with aerospace instruments. This system is among the few in the world which make it possible to have a comprehensive exploration of our planet from three different stages: From space vehicles in orbits a few hundred kilometers high, from airplanes flying a few thousand meters above the earth, and finally directly on the surface of the earth itself. This system ranges from multispectrum cameras for outer-space and aerial photos, to multispectrum projectors and image processing systems, digital drafting tables and continuous copiers, stereoplotters and rectifiers, and up to an interpretation atlas.

The repeatedly improved MKF 6 M (mass: 175 kg) occupies the top place in this long chain of equipment. It has six high-power Pintar 4/125 lenses which take

photos of the same area simultaneously in different spectral regions. One film cartridge is sufficient for more than 1,000 photographs (dimensions of the negatives: 55 mm x 80 mm). The large velocity of the space vehicle, amounting to about 8 km/s, is compensated for by a contrary movement of the camera lenses. The resolution of the MKF 6 M exceeds that of modern aerial cameras by two to three times. For photos in the visible spectrum, up to 160 line pairs can be differentiated at the center of the picture. The human eye makes out about five lines.

Photos taken with the Zeiss camera from outer space reveal both bungalows and boat-walks, and indeed even trails. At a flight height of 250 to 260 km, a single photograph covers a territory of 115 km times 165 km--that is, an area of 18,975 km^2. If the photographing is done without overlapping, and when the border contours are taken into account, it is found that 8 to 10 frames are sufficient to cover the entire territory of the GDR. A tilting of the space vehicle makes it possible to even include areas which lie more than 800 km beyond the region of direct overflight.

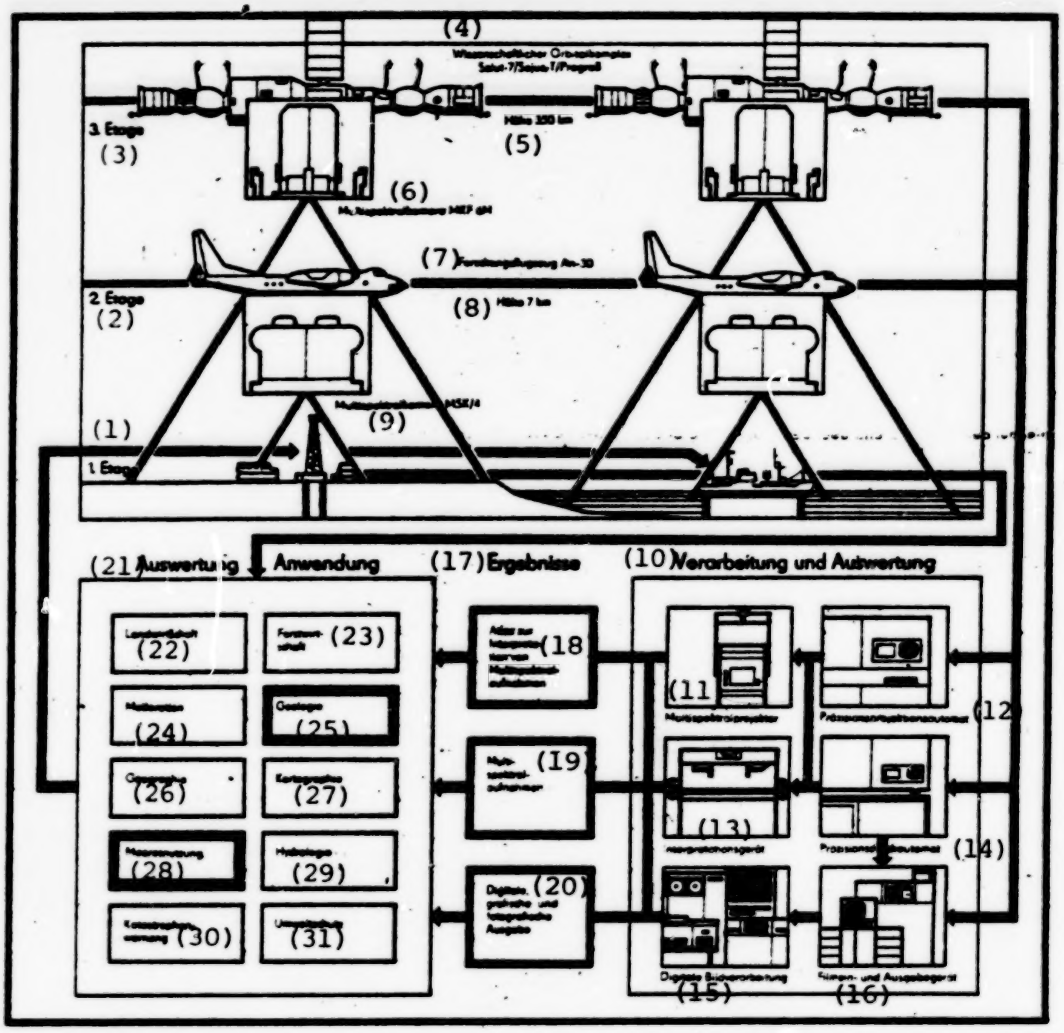
In Vienna, the four-channel multispectrum camera MSK 4 was shown for the first time in a foreign country. It is intended for airplanes, and it was produced on the basis of findings and experiences gained with the cameras MKF 6 and MKF 6 M. This "youngest" member of the family is in no way inferior to its older sisters with respect to its optical systems, control apparatus, and automatic function monitoring. Thanks to its high resolution, it is especially suited for employment in agriculture, forestry, and water management, as well as for exploring for mineral resources and for the protection of the environment. Another new item in the GDR's offerings at the Fair Palace was the digital image processing system BVS 6471 of Robotron and the Central Institute for Cybernetics and Information Systems. One of the plotting devices which have proven reliable for years now is the four-channel multispectrum projector MSP 4 C of Carl Zeiss, Jena. This device enables one to distinguish many fine details which usually cannot be discerned on conventional photographs from comparable distances--such as, for example, species of trees and types of grains, healthy crops and diseased plants. Since the photographs which are taken by the separate lenses of a multispectrum camera are analogous, they can be superimposed in the plotting process. The MSP 4 C has a projection area of 350 mm x 455 mm and has color filters for purple, blue, blue-green, green, yellow, and red, as well as having a transparent mode. The projector allows one to choose among more than 700 different hues in the composing of "false-color photos."

In this way, the plotter distinguishes exceptionally many details of the physical properties and states of the object being observed. Thus, various red hues can give information about freshly tilled fields, and shades of gray can give evidence of dying or ready-to-harvest vegetations. On the other hand, forests appear brown, fallow land blue-gray, barren mountains and cities green, and polluted air appears blue-green, just to mention a few examples. Of course, mineral resources cannot be directly detected, but slight spectral differences in the plant cover, special melting patterns in the snow, and highlighted geological structural differences give crucial information for prospecting.

Thus, during its 211-day flight the first skeleton crew of Salut 7 was able to give to the geologists the following information on deposits: Natural gas and petroleum in Central Asia, kimberlite--the matrix for diamonds and lead--in Siberia, and tin in the Far East. One focus of their earth exploration work with the MKF 6 M was the zone around the main Baikal-Amur line. Now an attractive proposal has been made on installing along this route transducers which can transmit emergency signals to space vehicles in times of dangerous situations. Among other things, this service could warn about avalanches and mudslides.

At the UNISPACE 82, one item attracting considerable attention was an atlas for the interpretation of aerospace multispectrum photographs, which was compiled by scientists of the USSR and the GDR and was published jointly by two academy publishing houses in three languages. By way of 88 multicolored plates in a 40 cm x 60 cm format, it explains the methodology for the interpretation of earth exploration photos by a series of typical cases. Besides the synthetic-color pictures taken with the MSP 4 C as well as picture details and graphics, this atlas also includes the thematic chart presentation derived from them, and data on visual and computer-aided photo interpretation. The examples can be generalized, and they show ways for their utilization in a wide variety of scientific disciplines and branches of economics. International experts have rated the interpretation atlas as a hitherto unparalleled standard work and handbook for all those who have to do with remote sensing.

The remote-sensing system presented by the GDR in Vienna, which extends from the outer-space camera to this instruction manual, has proved to be attractive especially to those young nation-states which are undertaking to do away with the legacy of the colonial yoke and to fully develop the mineral resources of their homelands. The devices from Berlin and Jena combine a high resolution with great stability and maximum self-sufficiency with a minimal technical input, making it possible for scientists and technicians to make themselves familiar with them relatively rapidly. The quality of this system, which is now available, certainly is conducive to promoting the realization among certain representatives of capitalist countries that in space technology as well their embargo policy has no prospects for success.



Key:
1. First stage
2. Second stage
3. Third stage
4. Scientific orbital complex Salut 7/Soyuz T/Progress
5. Height: 350 km
6. Multispectrum camera MKF 6M
7. Research airplane An-30
8. Height: 7 km
9. Multispectrum camera MKS/4
10. Processing and plotting
11. Multispectrum projector
12. Precision automatic projector
13. Interpretation device
14. Precision automatic printer
15. Digital image processing
16. Film input and output device
17. Results
18. Atlas for the interpretation of multispectrum photographs
19. Multispectrum photographs
20. Digital, graphic, and photo output
21. Interpretation - applications
22. Agriculture
23. Forestry
24. Land reclamation
25. Geology
26. Geography
27. Cartography
28. Use of the seas
29. Hydrology
30. Disaster warning
31. Environmental protection

SCIENTIFIC DEVELOPMENTS, PROBLEMS OUTLINED

New Science-Technology Control System

Warsaw TRYBUNA LUDU in Polish 4 Mar 83 p 3

/Article by Tomasz Miecik: "Accommodating the Needs of the Country"/

/Text/ Organizing Scientific and Technological Research

Much emotion and discussion, already many years old, is developing around an office which still does not yet exist, but which should be on everyone's mind. Of course, this office, agency, council, committee--whatever--still does not have a name. Its task would be the control of science and technology.

The potential of scientific research and development for the national economy is the employment of around 300,000 people. It is spread throughout institutions of higher education--88 colleges: after all, the Ministry of Science, Higher Education and Technology should be doing something, independent scientific research centers (scientific research institutions, centers of the Polish Academy of Sciences /PAS/, research development centers, plant experimental facilities and central laboratories) and, directly, industrial development facilities (construction offices, laboratories, research and experiment centers and plant development facilities).

The individual sectors of science and technology are not talking to one another; there is a duplication of effort and often contradictory interests. Parochialisms and even signs of reluctance dominate. Nonetheless, if the system could function, these structural absurdities could be left alone. But this is not the case.

Several years ago, an attempt was made to integrate the efforts of scientific research and development potential around the most important social research programs--so-called governmental, key and interministerial. One can say many nice things about this attempt, except that it succeeded as a method of organizing the system of research efforts, their discipline and their ability to show results. Time has shown that if we are to maintain the positive aspects of the central research programs, additional and more radical developments are needed.

These developments refer to matters of planning scientific and technological progress, as an example.

The modern development of science and technology is achieved mainly under the influence of social and economic requirements which both society and the economy submit for solution. On the other hand, however, science and technology progress according to their own inherent logic and laws to a considerable degree. The planning system must insure that society's goals are also science's and technology's goals. Consequently, the basis for this must be the significant participation of scientific and technological workers, their great influence on planning the directions of scientific development and the form of its future structure.

In planning scientific development, it is necessary to weigh social and economic influence on its progress and also the possibility that research efforts may even surpass their actual needs. This eventually leads to a guarantee of a certain amount of freedom for research efforts undertaken because of the individual initiative of centers, research teams or scientists themselves.

The next element, separating scientific and technological planning from the complex of social and economic planning, is the considerably large degree of uncertainty and risk which characterize, above all, basic research. Incidentally, research efforts themselves can lead to great discoveries beyond their original intent; we need only recall Pasteur and his research in the role of bacteria in wine fermentation for industrial purposes.

Of course, there are many more factors favoring the planning of research and technological development in social and economic planning. Let us, however, confine ourselves to what has already been discussed so that we can begin with an history of the concept of an office which would stimulate scientific and technological research. The history is instructive because the issue of creating such an office is not situational (who isn't looking for a patron in our difficult times?), that the issue is the result of much observation and the inadequacies in the development of our national science and technology.

In recalling this history, we will not, of course, return to those times when the Scientific and Technological Committee sat in Warsaw. After the committee was disbanded, it was learned for the first time that there was a lack of central control of scientific and technological development. This occurred as the 12th Plenum of the party's Central Committee (in 1978), in whose preparation--as we remember--a large number of scientists participated. We read in the materials prepared for the plenum: "In the concept of managing science and technology, Poland has adopted the idea that responsibility is borne by the directors of the appropriate economic organization within a general development strategy, mapped out by the central authorities for scientific and technological progress in the individual subsectors of production. In strengthening this responsibility, it is indispensable that there be an integration in the management of scientific and technological development issues and investment issues on various levels and in the enterprises, combines associations and ministries."

Attention was focused not only on this issue, but also on the many problems brought up at this plenary session of the party's Central Committee. The session was, after all, dedicated to the problems of science and technology in the service of the economy.

This theme was also raised at the 9th Party Congress. A discussion, which took place in a problem-solving team in a Congress resolution, signified that "scientific compliance in a creative role in society's service requires positive, immediate, and strategic actions on the part of the state. The congress has taken notice of the insufficient efforts of the state up until now in the area of scientific policy".

More or less at the same time, at one of the sessions of the parliamentary Commission of Science and Technological Progress, experts, invited from the scientific communities, attempted to define the concept of an office for scientific and technological matters. It was put so: "The Ministry of Science, Higher Education and Technology must assign an independent governmental agency, subordinate to the premiere, which would concentrate on hose research efforts accommodating the government's undertakings in economic, social and cultural areas. It should still be only a staff agency, functioning as a state patron for all research efforts undertaken by order of the government, and operating on the basis of extensive consultation with scientists, research centers, councils and commissions of specialists called together by the government. At no time would it be proper for the research centers to be subordinate to this agency."

A similar position was taken by the community of engineers and technicians at their 20th congress in Lodz. The congress's general report reads: "We recognize as useful and urgent the formation of a state agency with the serious participation of the social factor in the efficient formulation and realization of a scientific-technological policy at the national level."

It is stated in a resolution of one of the problem-solving teams at the engineers' parliament that this agency should be responsible for the state's total scientific policy, and should have a relatively small staff of highly qualified and competent personnel. One of its most basic tasks should be the close collaboration between the Polish Academy of Sciences and colleges in order to achieve cohesion in science and technology.

At the recent 57th Session of the General Meeting of the Polish Academy of Sciences, the expectation of scientific communities associated with the eventual appointment of a state agency for matters of research and technological progress was even more emphatically stressed. At the same time, the session declared itself for charging the Polish Academy of Sciences and other institutions of higher education with the responsibility of developing basic research. At the session, it was stated that the elaboration of the new system of selecting, planning, financing and controlling central research problems, which is to replace the current system of governmental, key and interministerial problems after 1985, should belong to the urgent tasks of the new agency. An analysis of the rules regulating economic reform principles from the point of view of innovations, and the preservation of the relationship between decisions in the area of research and development efforts and the directions of investment policy should also belong to these tasks.

It can be clearly seen that conceptions of a system for directing research and technological efforts, requested by various communities and facilities of economic research, differ little from one another. This is not bad at all. It only results in more extensive food for thought on the organization of agencies directing state scientific policy. Only one more thing can be added: the efforts in forming a chief agency of state administration, responsible for research and technological progress, are well advanced. Recently, the party's Central Committee Politburo familiarized itself with the project of a new system on central control in science and scientific-technological progress.

Problems in Scientific Community

Warsaw TRYBUNA LUDU in Polish 10 Mar 83 p 3

/Article by Adam Hollanek: "In a Better Atmosphere"/

/Text/ We conducted an interview with Prof Ignac Malecki, a full member of the Polish Academy of Sciences, on the problems and atmosphere in Polish science.

The interview took place during a party celebrating the scientist's 70th birthday. The party was organized by friends and alumni at the Institute for Basic Technological Problems. Professor Malecki has been awarded the Order of the Banner of Labor, 1st and 2nd class, and recently, the Commander's Cross with the emblem of the Order of Polish Rebirth. He received honorary doctorates from the University of Budapest and the Academy of Mining and Metallurgy in Krakow. He also belongs to our paper's circle of associates.

/Question/ We are interested in how those scientific fields, which you represent, are developing presently in this difficult, even crisis, situation. Would it also be an example of what is going on in our science and technology as a whole?

/Answer/ My first job, which lasted until the outbreak of World War II, was the direction of the Acoustics Laboratory of Polish Radio. From this workbench of our culture, I also began my scientific and technological activity in the postwar period of reconstruction. I formed a team of acousticians (first at the Institute of Technology in Warsaw, afterwards at the Institute of Basic Technological Problems), which contributed to the solution of numerous acoustical problems of show halls, philharmonics, theatres, studies of radiophony and also television. It began with projects for the parliament hall, the People's State Council hall and the National Philharmonic; it began with radio studio projects, first with Mysliwiecki, then with Woronicz in Warsaw. At the same time, the first Polish defectoscopes made their way into postwar industry, allowing the detection of production shortcomings. We used modern ultrasonic technology in these devices.

Today, later generations of our devices are operating in industry. Ultrasonics also began a career as probes controlling the peculiarities of deepening mine

shafts. They also played an important role in the development of a new Polish supply source--the supply in the formation of copper minerals in Lublin. On the other hand, they have recently served the drilling of shafts in Lublin's coal basin--the favorite in Polish mining. Under the direction of Prof Z. Filipczynski, ultrasonic diagnostics have been developed for medicine. A completely new branch of technology.

/Question/ And your Polish school of acoustics is still prospering?

/Answer/ You can definitely talk about a school in this case. After all, there is also an Acoustics Committee with the Polish Academy of Sciences, while the Polish Acoustics Society calims over 350 highly qualified members. Today, developments in acoustics are not as dynamic as before, though, despite the difficulties, our acousticians are not resting on their laurels. They have even reached the most modern fields--quantum acoustics and hypersonic acoustics. It concerns the harnessing of frequency quavers from the fringes of thermal quavers to the highest research efforts. In this fashion, acoustics have become a recognized instrument of various and complex phenomena of matter; they broaden microcosm research efforts. They also are beginning to play a role in microelectronics.

Another field which I represent--in the study of the progress of human knowlege--different things are happening. In sum, besides the here and there studies undertaken in scientific methodology, particularly in the problems of scientific policy, we are looking organizationally worse than in other countries, although in an earlier time, we belonged to the European forefront after the war.

/Question/ And how do you rate the situation in the area of scientific policy in Poland?

/Answer/ I think that in the face of limited material funds, money for science was divided too spontaneously in Poland. Also for the basic sciences. I am not talking here about any limitation of freedom in the direction science could take; however, I am talking about the most efficient selection of the most important problems in research in compliance with the widest social interest. Of course, in speaking about social interest, I am not thinking solely of economic advantages; I am talking about stimulating societal development in the entire complex sphere of the most important needs of Poland's citizens. The system of preferred problems is principally valid. It would be still more valuable if we could recognize the need for more selective activity. When one promotes everything, one basically promotes nothing. That which should be promoted should be jointly decided upon by scientists. They first have to determine among themselves what the issues of problem sleection are; at the same time, they have to reckon with the opinion of public and political organizations. Much depends on the trust between these parties.

/Question/ The atmosphere has improved somewhat in the scientific community. There is no longer a totally negative climate (caused also by its own actions), which characterized the Polish Academy of Sciences' meeting in the fall of 1980. It is moving to sensible realism. One can see distinct and definite

efforts at doing something beneficial for society, that society had something from its science. These tendencies, as it seems to me, are becoming pronounced, for instance, in certain areas of chemistry and biology. A lot is also being done in medicine. The agricultural sciences are intensively searching for ways to cooperate. And all of these fields are undoubtedly important and social.

/Answer/ They say that one of the main shortcomings of scientific development is often the lack of funds for equipping laboratories, assisting science, and the like. How much of this is true? We can overcome material-technological shortages in only certain fields. By necessity, selection will have to be narrow: physics, technology, and industry. We will also have difficulties with our higher education. Reconstruction is increasing; an intense economization has been reached in this area as far as cadre and resources are concerned. Many centers and many technicians but little productivity--from objective conclusions, and also from subjective ones.

A kind of sensible solution could be the creation of an institution, which could coordinate certain scientific matters and, especially, technological progress. Let the Committee for Technological Progress pass a resolution. The same is said for a need of the Council of Basic Research.

/Question/ Professor, you have always concentrated a lot of attention on international cooperation. Has this cooperation ceased or become somewhat weaker in your activities?

/Answer/ Somehow this cooperation goes on. For instance, take UNESCO; the goals of the studies on the directions of scientific development have been emphasized there. And that is from the aspect of public use, on a global scale. We will shortly have a meeting about this. I think that this problem is also worth a lot of study from our own Polish point of view. We can gain much in this area, especially through the international cooperation of scientists. Besides, this is what it is all about not only in the study of the progrsss of human study, but also in acoustics.

/Question/ How do you engage yourself in your agricultural obligations, both a home and abroad? When do you rest? Do you, professor, have any kind of hobby?

/Answer/ Perhaps this sounds coquettish, but work, especially intellectual work, is both labor and relaxation for me. I do not only work during the "official" time, but equally on vacations and weekends. At the same time, I do not travel very far, but always remain around Warsaw, to which I feel very close. I have a hobby--nature and natural history. But if we are talking about the hours spent in agricultural endeavors, then now, while I am not yet the director of the Institute of Basic Technological Problems, I hope to have more time and chances. Even if...they do not announce my first experiments as such for the time being.

Closer Scientific-Economic Ties

Warsaw TRYBUNA LUDU in Polish 9 Mar 83 p 3

/Article by Tomasz Miecik: "Advice on the Most Important Issues"/

/Text/ Experts' Reports of the Polish Academy of Sciences (PAS) More Relevant to the Economy

We ought to include the rebirth of advisory functions to the positive changes in Polish science. We can observe this process, for example, in the Polish Academy of Sciences, which along with its legal obligations, should be an advisor to the government not only in scientific matters, but also in social, economic, and structural ones as well. In fact, in anything where science has anything to say.

In scientific communities, especially in educational centers, the conviction was prevalent that the academy had not been demonstrating sufficient forcefulness and objectivity in representing its real needs and requirements as an advisor to the government. Consequently, it was said at one of the general meetings of the PAS that neither among the authorities, nor the public, nor even among the scientific communities had the conviction been established that the PAS was the institution without whose participation or opinions no essential issue refering to science could be decided.

Similar criticism has been leveled at the academy's activity as a governmental advisor and expert in other areas important to the government and state--above all, in the economic area. PAS has been accused of not requiring sufficiently the consistent implementation of proposals submitted to the authorities.

Today it would be difficult to answer the question of what the reason for this is. Perhaps it was the lack of public support; after all, scientific experts' reports were not accessible to public scrutiny. Perhaps it was the uncertainty as far as their acceptance by the scientific community was concerned, since all experts' reports were not essentially discussed at plenary meetings of the appropriate committees and scientific departments. Finally, the prestige of the academy itself was not involved. Ultimately, perhaps, it was the lack of conviction in the practicality of the proposals coming in from the recommended studies, even if it was impossible to doubt their good intentions.

It is important today that the Academy has extracted these proposals from the shortcomings of its past advisory activity. Still, the conviction of the majority of scientists that finding efficient and realistic ways to overcome the crisis is the most important issue for the people's vital interests, that serving this aim is the obligation of science towards state and society, is at the base of the rebirth of science's advisory capacity. To look precisely for these efficient and realistic ways to improve the situations in many areas, important to the country and economy, is the most outstanding feature, coming to the attention of all studies which have been recently penetrating the hall of the academy.

In the most recent experts' reports of the academy, those activities and proposals are being strongly emphasized which will lead to a technological improvement in the economy, better utilization of existing production and supply capacities and savings, where results can be more effectively used for more goods, as opposed to investments, which are still to be

Let us take an experts' report of the Academy's Committee for Energy Problems, as an example. In the report, they talk, of course, about long-term solutions and outlined the requirements in the area of nuclear energy. But the greatest emphasis in this study is placed on the technological improvement in fuel and energy consumption, finally leaving no illusions that the long-standing mismanagement of energy in Poland can be easily corrected, this too requires certain assets, but above all, time.

It would have been different had the people used the principle of thrift from the very beginning, or if this principle had not had to contend with the myths of the extreme inexpensiveness of, or the unlimited accessibility to energy, spread around for the longest time. We read in the cited study: "These myths had an effect on the national prices of coal and electricity for consumers. This next resulted in the fact that it was not worth installing devices or applying technology in order to lessen energy consumption. That is to say that while it would have been more efficient, it would have been more expansive--at least as far as investments were concerned--and that would have been contrary to cost effectiveness. This was often the result of the designers' habits, or of ignorance."

The "assimilation" /wstecz/ program--the modernization of already existing technologies, insulating old building, etc.--requires assets and time, and that is what this talk is all about. In metallurgy, iron and steel, however, (12-16 percent of national energy expenditure), a reduction in the loss and salvage of heat can be achieved relatively quickly. Technological changes, from the point of view of the chemical industry, do not always require total reconstruction--they can be introduced gradually, a little at a time, during major renovations. Similarly, changes in the direction of energy-saving technologies in the building materials industry can be implemented gradually. (In Poland, the so-called "wet method" production of cement consumes nearly twice as much energy as do world technologies).

Energy consumption is too high in Poland in relation to the gross national product by about 30 percent and could be reduced by that much without harming the economy. Effective economy in reducing energy consumption is considerably better than the effectiveness of locating additional energy.

It is necessary to know where and how to economize. The experts' report answers this question. All that is necessary is to mobilize those appropriate economic mechanisms which will push the economy in the desired direction.

A similar course--the utilization of reserves and the war on mismanagement--is presented in another academy experts' report; it originated in the Department of Agricultural and Forestry Sciences.

The mismanagement of agricultural supplies--as was indicated--begins with the producers and ends up with commerce and consumption. And so, for example, the damage to potato bulbs during harvest and transport is estimated to be at 15 percent. Beet sugar yield, which in recent decades had been cultivated in campaigns of 110 days, is falling to less than half compared to optimum periods. In recent decades, sugar production is becoming, frankly, unprofitable. The growing campaign should last less than 90 days.

The low quality of vegetables and their uncharacteristic storage leads to losses; during the 4-5 months in storage, 50 percent is lost. Losses in the production of fruit, while in storage, is estimated to be 15 percent. The low technological quality of cole and the drawbacks in its storage and transport result in annual losses of about $7 million.

At this point, it would be beneficial to take a look at the fact that talk in a similar vein--let us protect and respect that which we turned out, thinking at the same time about an increase in production--was made by many speakers at the recent joint plenum of the party Central Committee and the Chief Committee of the ZSL.

And there is still one more of these newest studies which was presented at the last general meeting of the academy. It concerns the use of stores of mineral resources.

We note extensive mismanagement especially in this activity: operating, processing, and production losses; they amount to 30 percent for copper, 50 percent for zinc, 30 percent for lead, 45 percent for sulphur and 72 percent for hard coal. And what do these figures mean? After all, the losses just in copper, beginning with mining, through its processing, amounted to around 218,000 tons in 1980; i.e., 38 percent of its contents in proven deposits. These losses are greater than the entire acquired copper from the mining in the largest shaft at "Rudna".

Of course, even in this case there are many obsolete technological processes in production and processing requiring modernization, which will be expensive. But can't we eliminate the losses, already arising in the phases of documenting the geological deposits, which would require not so many outlays as changes in obsolete recordings and research methods? These mistakes in the field have already led repeatedly to oversights of deposits; for example, gas in the Fore-Carpathian Depression and on the Fore-Carpathian Monocline. Shortcomings in geological documentation have also appeared in regard to shaft construction in the Lubel coal basin.

Projected efforts for the mine basins and shafts, which should together insure the economic effectiveness in the mining of raw materials, the most effective economy of the deposits themselves and the protection of the environment, have had some effect on the degree of use of these mineral resources.

The Rybnicki coal basin, the copper basin in Legnica and the brown coal shafts in Belchatow prove that the many mistakes in this area can be corrected without an influx of financial outlays.

In just such a manner, the academy's experts' reports have been touching lately our most important national problems and are focusing attention on the need for solutions, which do not exceed our current organizational opportunities.

We have concentrated solely on those studies which refered to energy, agricultural and mineral resources. Let us remember, however, that these are really only "trumps" which our country can use to get us out of crisis--or to develop our economy in a normal fashion.

In the end, the academy's experts' reports are only fascinating reading material. But they are not known or extensively studied for this reason at the various levels of instruction, ultimately complying with the spirit and letter of the 9th Party Congress Resolution on the theme of a greater advisory role for science.

High Cost of Science

Warsaw ZYCIE WARSZAWY in Polish 7 Mar 83 p 3

/Article by Bozena Kastory: "The High Cost of Science"/

/Text/ ZYCIE conducts an interview with the science secretary of the Polish Academy of Sciences, Prof Dr Zdzislaw Kaczmarek.

/Question/ Professor, you recently said concern for the development of science is society's duty towards its own future. How would you evaluate the depth of this concern and its real impact?

/Answer/ If you are asking whether we should economize with science during a difficult period or should lavish support on it, then I believe that this question is rhetorical. Especially when it is difficult, society needs to provide particular support to intellectual communities and to science as well. Science should develop various methods of relieving the difficulties in the economy and the public sector. We cannot allow ourselves to be overwhelmed by 1982's events or cease wondering in 1983 what we will have in 20 or 30 years.

And now, if we are talking about material assets, then modern science is an expensive occupation. Beyond certain fields of endeavor, like the humanities or the theoretical areas of the exact sciences--complex devices and material reagents are necessary. All this costs and I would like to return to this. Material conditions are not the only problem. Creative communities are sensitive to the climate which takes care of them.

/Question/ Do you think that trust towards the scientific community is less than it was several years ago?

/Answer/ It seems to me that this is the case.

/Question/ Are you thinking of trust on the part of the public or on the part of the authorities?

/Answer/ I think of both. There was once such a time, particularly during the 1960's, when science was regarded as a kind of cure-all for all the problems facing humanity. Whether it was the problem of hunger, which was to be resolved by the "greeen revolution", or some sickness, incurable up until now. There were many forecasts which did not come to pass because they were the results of inaccurate prognoses.

/Question/ That explains the general loss in trust; what about here, in Poland?

/Answer/ Poland has additional problems with its science and technology communities because of the economic mistakes of the 1970's. It is true that the signatures at the bottom of many scientific and technological decisions belong to the scientific community. But we must not generalize. After all, there are various groups and different in the scientific community. If we begrudge many decisions, then I am for specifically saying that a definite group of experts led the public astray--as a result of incorrect appraisals or because it took a position lacking principle.

/Question/ And what if we are talking about trust on the part of the authorities?

/Answer/ In the first place, the opinions of science can be a convenient screen for the economic authorities. Most anything can be conducted behind this screen based on the appropriate expert's report.

In the second place, the authorities have complaints against science every now and then, that science is insufficiently competent in solving current problems. And this is a misunderstanding because it seems to me that science will never solve today's problems. It is not called upon to do so. Research efforts require a certain amount of time and the process of studying the results is also long. It is the same all over the world. Differences in an expert's report will lead to a difference in his research.

/Question/ Can science assist reaching realistic goals?

/Answer/ Above all, science should assist in formulating these goals and in this, I see a role for experts' reports. We have at the academy the "Poland 2000" Committee, whose task is the forecast of trends in social development and the formation of goals, which can be realized.

/Question/ This committee has been around for many years; who do you rate it? Have its forecasts become reality? At least at this time, where could we see some results?

/Answer/ I have already stated that excessive optimism is a feature of our forecasts. We pay dearly for this optimism afterwards. There is an isolated question--How are these forecasts later utilized? The academy's experiences are negative. An excellently prepared energy report was not considered; the economic decisionmakers disregarded it. Now the situation is changing. State and political authorities are urging the preparation of these experts' reports.

The academy's direction has received a letter from Vice-Premier Janusz Obodowski in which he asks us to expand cooperation. We also foresee a meeting with the chairman of the Planning Commission regarding scientific advise.

/Question/ Does this better atmosphere apply only to the authorities' representatives or to the science community as well?

/Answer/ I have noticed no reluctance on the part of my colleagues to take up this challenge. On the other hand, the problem of know-how and honesty in achieving it is another matter. The excessive optimism of previous years costs us a lot.

/Question/ Professor, science has its own laws of development and its own internal logic, and finding compromise between the interests arising as a result of its internal laws and the external expectations has been always difficult. How is the selection of research objectives made so that they might be of use to society?

/Answer/ Ninety percent of the scientific efforts made in Poland are associated with problems contained in the central research plan. They are, therefore, at least theoretically, attuned to the needs of the economy. All research efforts, entering into the compulation of government programs, crucial and interministerial problems, are planned and evaluated in the state's decisionmaking process.

/Question/ If, afterwards, reservations are voiced concerning the research objectives, like they are not associated enough with economic needs, one could ask, where were the so-called decisionmakers when the research programs were set up?

/Answer/ In the majority of cases, the initiative has emerged from the scientific community--this is the truth, but at the same time, every aspect of the central plan had been approved by the state authorities at various levels. Government programs are adopted by the Council of Ministers, crucial issues are approved by at least two ministries--i.e., the ministry supervising the issue and the Ministry of Science, Higher Education and Technology. Interministerial issues from the scope of basic research efforts are approved by the Polish Academy of Sciences' direction and by the Science Ministry. If we run into reservations or comments that research objectives are swerving away from public needs, then complaints should also be directed towards the authorities for this situation. I believe that this is an expression of the weakness of our science policy, a weakness strongly based on the fact that the decisionmakers did not really know what the actual future needs of the economy would be.

/Question/ You mentioned, professor, at an academy conference that the current method of setting research objectives would have to be changed, beginning in 1986. Why the need for change?

/Answer/ Perhaps, first of all, because of the selection of tasks. I am aware that after 15 years of experience, with the system of crucial issues, we need to look at them anew. This system is too rigid. Certain slogans and problems are selected and a comprehensive thematic plan is set for 5 years. Practice shows that nearly all the issues, formulated at the beginning of the 1970's, were brought forward into the second half of the decade and then, into the 1980's. I would support a system, in which one could formulate tasks in a more flexible manner. Maintaining priorities, we should allow institutes or centers of higher education to suggest new research themes on a competitive basis.

/Question/ Conversing with many coordinators of government programs, crucial or interministerial issues, I heard the opinion that the evaluation system of their realization is regarded as one of the best so far. The possibilities of meetings on the subject, in which the representatives of various scientific communities participate, of an exchange of opinion and an evaluation of the research efforts by a competent body dominates considerably over the bureaucratic method of reporting on research efforts. For this reason, it bothered me to hear that you, professor, consider a change in this system as necessary. But now I understand that this change refers to the way research objectives are formulated and not to their implementation procedures.

/Answer/ I also think that the most valuable aspect of our present system is exactly this coordination on the subject; i.e., the chance to confront the results acquired by different centers in he science community. On the other hand, I think that a drawback of the system is the fact that once an issue has been inserted to the plan, it must have already been stuck in it somewhere for 5 or 10 years. It was very difficult for new tasks to make their way into the plan, because the amount of funds had been determined and the money divided 2 years before the 5 year plan.

/Question/ Will we succeed, however, in maintaining this system, with its many advantages, when there will be a cut-off in the money from the Central Fund for Technological and Economic Progress next year? These assets, concentrated until now in the Science Ministry, will find their way into the management of individual enterprises, which, it seems to me, are not inclined to designate them for long-term scientific research programs. They would rather like to have a profit from their money in a short time, preferably before the end of the year so that they could divide it up among the workers.

/Answer/ We have now reached a key problem for science. Speaking specifically, in 1983, 28 billion zloty of the state budget were earmarked for science. At the same time, we estimate that about 40 billion will go to industry--as depreciated value earmarked for technological progress. The law concerning the financing of enterprises forecasts that in the years 1982-1983, half of this fund is concentrated in the account of the Ministry of Science, Higher Education and Technology as the Central Fund for Technological-Economic Progress. Before 1981, practically all assets generated in the enterprises for technological progress were concentrated in federations and ministries. Currently, it is half. But from 1984, there will be no legal grounds to continue this process. In the meantime, government programs, crucial issues

and others have been financed out of these 20 billion zloty. And so, we imagine this inflow of resources will cease next year and the Central Fund will disappear...

/Question/ It is to be replaced by a system of individual contracts between the science centers and the enterprises.

/Answer/ Yes, but what does it mean in practice? It means that issues, around which practically all science operates, would have to disappear or be drastically limited. We must keep in mind that enterprises are not interested in financing this type of research.

/Question/ By proposing such a law on enterprises, was not this thing foreseen?

/Answer/ No, I don't think so. The objective of the reform is the creation of conditions for the enterprises to operate more independently. Hence the acceptance of the formulation that resources for the technological-developmental fund remain under their management. Two things have not yet been coordinated: the program of research efforts, already set for a long time, with the new mechanism for financing science.

/Question/ And why, professor, hasn't this been done?

/Answer/ It is difficult for me to answer this question. These laws originated, like the entire reform as well, in 1981, when there was a lot of pressure to reduce the role of the center in the economic system.

/Question/ But this is the "from the wall to wall" method. Out of the frying pan into the fire?

/Answer/ Yes, that's the twist. It was set to go at the beginning of 1982, when this law was adopted. Time was needed to rebuild the entire system and they postponed its introduction in the years 1982-1983. Now we have a problem before us: What do we do next? There are two possibilities: either we increase the share of the state budget in funding research efforts, or we amend the law on enterprises and continue to concentrate a portion of the resources on science. This is the most realistic thing to do. Because, after all, many research problems are also social problems; for instance, issues of ventilation, deep mining or gas explosions are common to all mines.

/Question/ Will there still be a need to change the law, after a year, before it even comes into effect? To strengthen public trust in the legislator? To learn how to foresee this, what will happen in 1 or 2 years?

/Answer/ Maybe this is not so. But it still would have been worse to maintain a situation, in which the most important part of the research programs would have had to be crossed out of the plan.

/Question/ Have efforts in the direction of amending the law or increasing that portion of the state budget, which has been earmarked for research, been undertaken? Nineteen eighty-four is already close.

/Answer/ Discussions on how to fund science after 1983 are now going on--it is too early to say. There are two roads--money, in the end, still flows from what the enterprises produce. So much, that either they increase the state budget after taxes, and then we can fund research, or we have to concentrate a portion of the enterprises' write-offs progress. I would be for increasing the budget's role in funding research, and, moreover, I would be for finding some kind of formula to combine the resources of the enterprises, earmarked for common efforts. This can be solved in different ways.

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